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NEW SPECIES OF *BEGONIA* (BEGONIACEAE) FROM GUERRERO, MÉXICO

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ABSTRACT

Three new species of *Begonia* from Guerrero are described, discussed, and illustrated: **B. martinezii** Burt-Utley & Utley, **B. macvaughii** Burt-Utley & Utley, and **B. tlapensis** Burt-Utley & Utley.

Begonia in México is represented by 112 currently recognized species, including the three that are described herein. Of these, 37 of the 56 known taxa with leafy erect stems develop from underground tubers and are characteristic of many species in sect. *Knesebeckia* (Kl.) A. DC., as circumscribed by both Klotzsch (1854) and Alphonse de Candolle (1859, 1864). The Mexican tuberous species, with few exceptions, occur in western and central México and Oaxaca in seasonally dry environments, where their habitats range from areas with tropical deciduous forests to pine-oak or oak forests and rarely cloud forests. In Flora Novo-Galiciana, 19 of the 25 *Begonia* species treated are tuberous (Burt-Utley & McVaugh 2001) and represent just over half the tuberous species from México (Burt-Utley, pers. obs.). Moreover, 17 of the recognized tuberous species are known to develop bulbils in their leaf axils and, in some instances, leafy erect stems grow from the tubers but produce only bulbils, allowing these species to reproduce asexually in the absence of flowering. Once bulbils are dispersed, they can sprout and develop into new, presumably genetically identical tuberous individuals. In Guerrero, there are 21 known tuberous species, including the species described herein, 10 of which produce bulbils in their leaf axils. In contrast to the situation in México, only five tuberous species are reported from all of Central America, and only two of these taxa are endemic there. With the recognition of *B. martinezii*, *B. tlapensis*, and *B. macvaughii*, there are now 28 known *Begonia* species reported from Guerrero.

1. BEGONIA MACVAUGHII Burt-Utley & Utley, **sp. nov. TYPE. MÉXICO. Guerrero.** 12.3 mi N of MEX 200 on MEX 134 from Salitrera to Cd. Altimirano, 1000 ft, 22 Jul 1990, *J. Utley & K. Utley 8531* (holotype: MEXU; isotypes: CAS, DUKE, MICH, MO, NY, UC, US, USF). Figure 1.

Begonia biserrata Lindl. var. *glandulosa* L.B. Sm. & Schub., 1945. Contr. Gray Herb. 154: 23. **TYPE. MÉXICO. Guerrero.** Wet cliffs near Acapulco, 24 Jun 1935, *O.M. Clark 7223* (holotype: NY; isotype: MO!).

Monoecious herbs 3.6–13 dm tall, developing annually from underground tubers 2.2–2.6 cm diam. leafy stems erect, branching freely, occasionally producing solitary large bulbils to 5 mm at the nodes; internodes of main stem elongate, 3–11 cm, sparingly to densely villous with white-clear spreading trichomes 0.5–3 mm, these occasionally appearing glandular tipped. **Leaf blades** decreasing in size from mid-stem to apex, asymmetric, transverse to oblique, rarely almost straight, ovate to narrowly ovate or broadly obovate in outline, 6.5–24 X 2.8–12 cm, basally cordate to very shallowly cordate, apically acute to rounded or acuminate to attenuate-acuminate, marginally usually deeply (2–)3(–5)-lobed, rarely unlobed, the lobe opposite the petiole insertion to ½ the width of the blade or more, lobes acute to rounded or acuminate, ciliate and ciliate-denticulate to ciliate-serrulate,

villous above and beneath; 4–6(–9)-palmatinerved; uppermost blades greatly reduced to wanting, when present frequently very narrowly ovate; petioles decreasing in length from plant base to apex, 2–12 cm, villous with spreading trichomes 1–3 mm; stipules persistent, ascending to spreading, symmetric to asymmetric, the pairs unequal, oblong-ovate to broadly oblong, 2–8 X 1.5–7 mm, marginally ciliate-incised, sparingly villous. **Inflorescences** axillary and terminal, occasionally with a large bulbil at the nodes, few-many-flowered; peduncles 1.3–3.5(–4.5) cm, villous with usually glandular tipped trichomes to 2 mm; bracts persistent to very tardily deciduous, spreading, ovate to oblong or obovate, 2–3.5 X 1.5–2.5 mm, marginally and apically ciliate-laciniate, glabrous to very sparingly villous. **Staminate flowers** with pedicels 0.8–1.7 cm, glandular-villous; sepals 2, ovate or narrowly ovate, (0.9–)1.1–2.1 X 0.6–1.4 cm, apically acute to attenuate-acuminate, marginally sparingly irregularly ciliate to ciliate-denticulate, villous, light to dark pink; petals 2, elliptic to obovate or ovate, (0.7–)1–1.9 cm X (3–)5.5–8 mm, apically rounded to attenuate-acuminate, marginally very sparingly ciliate, glabrous, colored like the sepals; stamens 46–74, monadelphous; filaments 1–1.5 mm; anthers obovoid to ellipsoid, 0.6–1 X 0.6–1 mm. **Pistillate flowers** with pedicels (13–)18–25 mm, glandular-villous; bracteoles wanting; tepals 5 or if 4, then 1 deeply bilobed, subequal, ovate to broadly ovate or obovate, (0.9–)1.2–1.8 cm X (3–)5–12 mm, margins somewhat undulate and occasionally irregularly to regularly ciliate, the outer 3 only villous, light to dark pink; ovaries trilocular with bipartite placentae, (4.5–)8–12 mm, villous to minutely glandular and villous; styles 3, 1–2.5 mm fused to half their length; stigmas bicornute. **Capsules** with pedicels 2.1–4 cm; bodies 1.4–1.9 cm; locule chambers externally appearing obovate to elliptic, (0.8–)1–1.2 cm X 6.5–9.5 mm; wings 3, the primary wing asymmetrically triangular to ovate, (1.3–)1.6–2.1 X 1.2–1.7 cm, marginally sparingly ciliate to ciliate-denticulate distally; the second asymmetrically lunate to symmetrically triangular, 5–13 X 9–14 mm; the third marginiform, and lunate-triangular.

Additional specimens examined. MÉXICO. Guerrero. Mpio. Juan R. Escudero, Los Copalitos cerca El Zapote, 1 Jul 1986, *M.A. Gomez & L. Marquez* (MEXU); Mpio. Mochitlán, Agua de Obispo, 850 m, 12 Jul 1980, *L. García Marinez 86* (MEXU); 890 m, 12 Jul 1981, *J. Pérez Martínez 98* (MEXU); *R. Gonzalez 62* (MEXU); 850 m, 27 Sep 1987, *G. Espinosa Flores 220* (MEXU); Dist. Montes de Oca, Mpio. Montes de Oca, Vallecitos, 11 Jul 1937, *Hinton 10593* (K, LL, UC, US); Mpio. Tierra Colorada, 12 km despues Tierra Colorada, carr. Tierra Colorada-Teconapa, 28 Jun 1985, *G. Espinosa Flores 398* (MEXU); steep limestone banks on Hwy 95 ca 11.4 mi N of Tierra Colorada or 4.5 mi N of Ocotito (km 50), 2800 ft, 17 Jul 1989, *Utley & Utley 8397* (CAS, CGE, GH, IBUG, LL, MEXU, MICH, MO, NY, US, USF); Mpio. Zihuatanejo, 21 km NE de la desviacion a Cd. Altamirano, sobre la carr. Zihuatanejo-Cd. Altamirano, 400 m, 24 Jul 1996, *J. Soto Nuñez, Román de Soto & Soto Román 9654* (MEXU, USF); Mpio. Zihuatanejo, en la Mesita 21 km NE de la desviacion a Cd. Altamirano sobre la carr. Zihuatanejo-Cd. Altimirano, 400 m, 24 Jul 1996, *J. Soto Nuñez, A. Román de Soto & F. Soto Román 9654* (MEXU); 12 mi S of Tierra Colorada, 1200 ft, 20 Jun 1952, *E.H. Cooper & C.M. Rowell 2646* (MICH); 6 mi N of Ocotito, 3000 ft, *H.A. Floyed & C.L. Ryan 317* (MICH); 0.5 mi N of Acahuizotla, 2800 ft, 26 Jun 1954 m *D.F. Herald & E.E. Clark 335* (MICH, TEX); 2 mi S of Acahuizotla, 3000 ft, 16 Jul 1952, *C. Rowell 3090* (MICH); Km 338, 3km beyond Acahuizotla on hwy to Acapulco, 3000 ft, 23 Aug, 1948, *H. Moore & Wood 4722* (BH, MEXU, UC). **Oaxaca.** 20 km N of Pinotepa Nacional, 170 m, *H.M. Hernandez & R. Torres 438* (MEXU).

Etymology. It is a pleasure to name this interesting species in honor of the late Dr. Rogers McVaugh (1909–2009) who collected extensively in western México and undertook Flora Novo-Galiciana. His publications on the travels of 19th century collectors in México have been an invaluable resource for our research with *Begonia* and *Hechtia* (Bromeliaceae).

Distribution and habitat. *Begonia macvaughii* is known only from Guerrero and adjacent Oaxaca between 170 m and 910 m, where it grows along moist roadbanks and stream banks in

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Begonia
Guerrero: Mex 134, 12.3 miles N of Mex 200 along Hwy from La Salitrera (near Zihuatanejo) to Cd. Altimirano. Evergreen forest—roadbanks and vegetation along small stream. Elevation 1000 feet
Herb to 1.3 m on moist roadbanks; flowers dark pink without, lighter within; apparently tuberous
John and Kathy Utley # 8531
22 July 1990

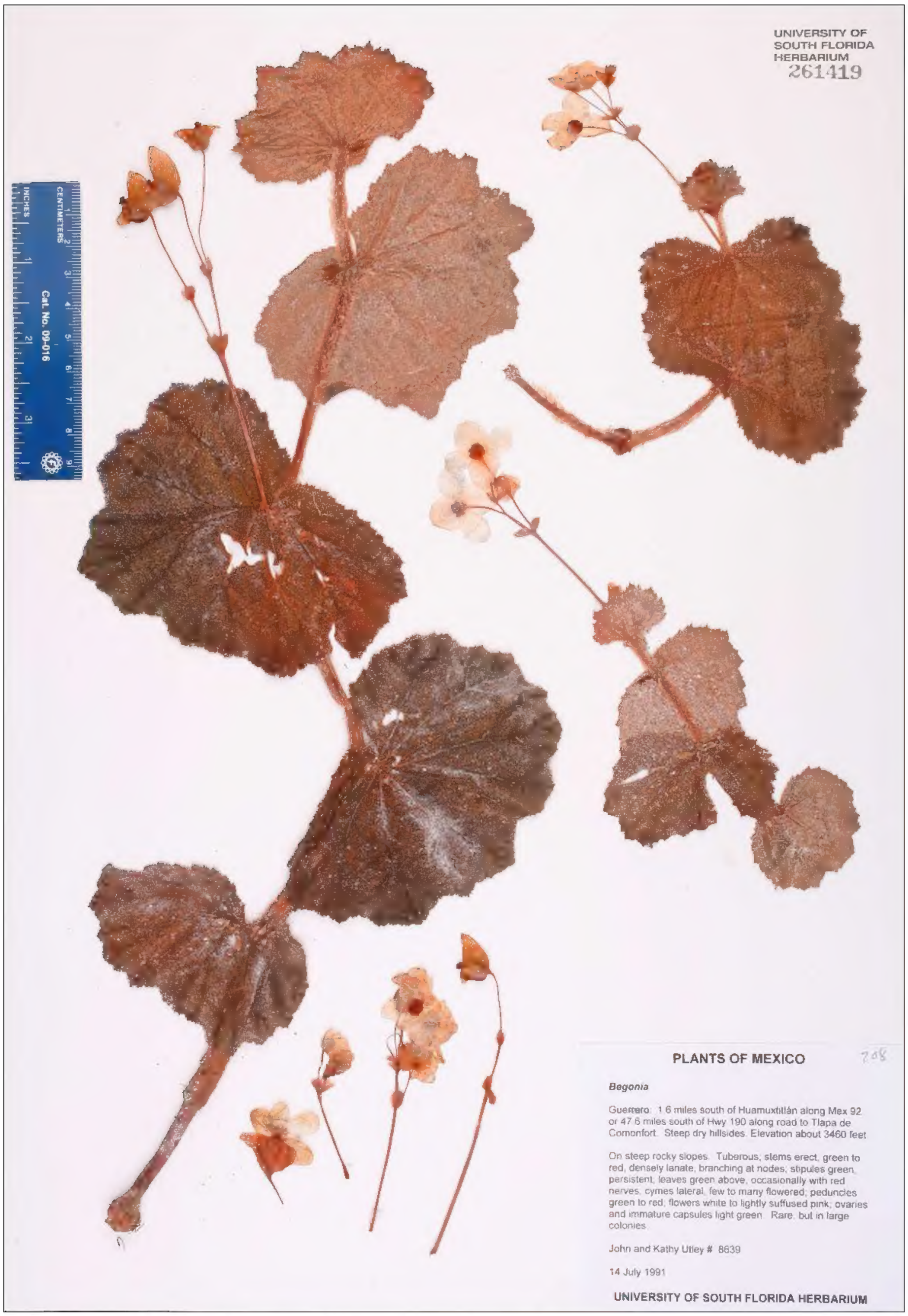
Figure 1. *Begonia macvaughii*. Isotype (*Utley & Utley 8531*, USF).

evergreen forests, and *bosques tropicales subcaducifolias*, as well as on open, steep, limestone roadbanks. It is expected to occur in Michoacán in the appropriate habitats.

Begonia macvaughii is an attractive species with oblique to transverse, basally cordate leaf blades. It was originally described as *B. biserrata* var. *glandulosa*, but in examining extant specimens and our collections of this latter taxon (*Utley & Utley 8397* and *Utley & Utley 8531*), it became obvious that these specimens represent a distinct species that is readily distinguished from *B. biserrata* by both vegetative and floral characters. Unlike *B. biserrata* with its leaf bases that superficially appear cordate but are cuneate at the petiole-blade junction and bordered on either side by bladeless nerves, those of *B. macvaughii* are unequivocally cordate to very shallowly cordate with the lowermost nerves bordered on either side by blade tissue. Moreover, leaf blades of *B. macvaughii* have distinct leaf apices, in contrast to those of *B. biserrata*, which typically lack them. Interestingly, leaf apices and lobe apices of *B. macvaughii* can vary in form within leaf blades of a single specimen. The persistent stipules of *B. macvaughii* also distinguish this species from *B. biserrata* with its caducous to fugacious stipules. It also appears that *B. macvaughii* is consistently monoecious while *B. biserrata* is very frequently dioecious or sometimes temporally dioecious and rarely monoecious. Inflorescence characters also readily distinguish this species from *B. biserrata*, the most obvious of which is its persistent to tardily deciduous bracts that contrast immediately with the fugacious to caducous bracts characteristic of *B. biserrata*.

2. **BEGONIA TLAPENSIS** Burt-Utley & Utley, **sp. nov.** **TYPE. MÉXICO. Guerrero.** Huamuxtitlán, 1.6 mi S of Huamuxtitlán on Mex 92 or 47.6 mi S of Hwy 190 on rd to Tlapa de Comonfort, ca 3460 ft, 14 Jul 1991, *J. Utley & K. Utley 8639* (holotype: MEXU; isotypes: B, BH, BM, C, CAS, DUKE, F, GH, IBUG, K, M, MICH, MO, NY, UC, US, USF). Figure 2.

Monoecious herbs 8.5–39 cm tall, developing annually from underground tubers to 8 mm diam; leafy stems erect, branching freely; bulbils not evident at nodes; internodes of main stem elongate, (1.8–)3–8.5 cm, lanate to pilose with very fine sericeous trichomes to 6 mm. **Leaf blades** straight, symmetric, broadly transversely oblong-elliptic to deltoid or hemiorbicular, (2–)4–8(–11.5) cm X (2–)6–15 cm, basally cordate, apically shallowly acute or with no distinct apex, marginally shallowly to very shallowly lobed, the lobes acute to acuminate or rounded, and ciliate-doubly dentate to ciliate-doubly serrate, or ciliate-denticulate to ciliate-serrulate, typically densely pubescent to lanate above, lanate below with trichomes matting, or only rarely pilose; 9–11-palmatinerved; petioles typically wanting, rarely to 4 mm; stipules persistent, variable in form, asymmetrically ovate to elliptic, dolabriform or triangular, (5.5–)7–13(–22) X (4–)6.5–13 mm, marginally ciliate to ciliate-denticulate or serrulate, irregularly weakly lobed, pilose above and below, but occasionally glabrous above. **Inflorescences** typically weakly asymmetrically cymose, axillary and terminal, 1–3 times dichotomous, the uppermost inflorescences exceeding the foliage, several-flowered; peduncles (3–)4–9.5 cm, pilose with trichomes 2–4.5 mm; bracts persistent, spreading to ascending, variable in form, orbicular to hemiorbicular, broadly asymmetrically ovate or obovate, the lowermost 4.5–16 X 4–13 mm, marginally ciliate-laciniate to ciliate-serrulate, pilose to lanate. **Staminate flowers** with pedicels 1.1–2.4 cm, glabrous or occasionally sparingly pilose; sepals 2, suborbicular to very broadly ovate or broadly elliptic, 8–13.5 X 8–14 mm, apically acuminate, marginally finely ciliate-denticulate, only rarely sparingly so, externally glabrous to sparingly pilose, white to pale pink; petals 2, obovate, 10–15 X 5.5–10 mm, marginally entire, white to pale pink; stamens 30–61, monadelphous; filaments 0.2–2 mm; anthers broadly obovoid, 0.5–0.8 X 0.5–0.8 mm. **Pistillate flowers** with pedicels (0.9–)1.3–2.5(–3.2) cm, glabrous to sparingly pilose; bracteoles wanting; tepals 5, occasionally persisting on maturing capsules, variable in shape and size, unequal, suborbicular to obovate or broadly obovate, 7.5–10(–14.5) X 4–8(–12) mm, marginally finely ciliate-denticulate, only rarely sparingly so, glabrous to sparingly pilose, white to very pale pink; ovaries trilocular with bipartite placentae, ovuliferous throughout, 7.5–10(–13) mm, glabrous to sparingly pilose; styles 3, 1.5–2 mm, fused to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Begonia
Guerrero. 1.6 miles south of Huamuxtitlán along Mex 92 or 47.6 miles south of Hwy 190 along road to Tlapa de Comonfort. Steep dry hillsides. Elevation about 3460 feet
On steep rocky slopes. Tuberous; stems erect, green to red, densely lanate, branching at nodes; stipules green, persistent, leaves green above, occasionally with red nerves, cymes lateral, few to many flowered; peduncles green to red; flowers white to lightly suffused pink; ovaries and immature capsules light green. Rare, but in large colonies.
John and Kathy Utley # 8639
14 July 1991
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Figure 2. *Begonia tlapensis*. Isotype (*Utley & Utley 8639*, USF).

half their length; stigmas bicornute, persisting on developing capsules. **Capsules** with pedicels (1.3–)1.9–2.8 cm; bodies 8.5–14(–17) mm; locule chambers externally broadly obovate to transversely elliptic, 6.5–9 X 6–9.5 mm; wings 3, unequal, the largest sometimes weakly arcuate, asymmetrically triangular to ovate-elliptic, 9–16 X 7.5–11 mm; the second and third asymmetrically triangular to ovate and subequal to each other, or occasionally the third shallowly lunate-triangular, 5–10 X 7–10 mm.

Additional specimens examined. MÉXICO. Guerrero. Tlapa, 1300 m, 15 Aug 1972, *E. Matuda 38472* (CAS-[2], MO). **Oaxaca.** Distr. Juxtlahuaca, Laguna Esmeralda de Tecomaxtlahuaca, 12 km SW de San Miguel Tlacotepec, 2690 m, 18 Jun 1982, *R. Cedillo Trigos & R. Torres 1452* (MEXU, USF).

Etymology. *Begonia tlapensis* is named after Tlapa de Comonfort, Guerrero, where Dr. Eizi Matuda first collected this attractive species.

Distribution and habitat. *Begonia tlapensis* is known only from very dry calcareous areas of Guerrero with thorn-scrub vegetation and seasonally dry forests of northern Oaxaca at elevations between 1300 m and 2690 m. The type series is from a very dry region with thorn-scrub vegetation and abundant *Hechtia* and *Opuntia.*

Begonia tlapensis is an attractive species that was abundant at the type locality. Within both the type series and *Matuda 38472*, variation can be observed in pubescence density. Although individuals of this species have predominantly lanate internodes, there are individuals within a population with significantly less dense pubescence, as observed on *Matuda 38472* (MO) that consists of both a lanate specimen and a pilose one. *Begonia tlapensis* can immediately be distinguished from other Mexican *Begonia* by its leaves that consistently lack petioles. Only two other Mexican taxa are known to at least occasionally have apetiolate leaves, *B. monophylla* A. DC., with which *B. tlapensis* appears most closely allied, and *B. angustiloba* A. DC. — both are also from Guerrero and other parts of western México (Burt-Utley & McVaugh 2001).

From *Begonia monophylla, B. tlapensis* is distinguished by its well-developed branching stems with several leaves, in contrast to a single large basal leaf and modified stems with much reduced to rudimentary leaf blades. In particularly robust specimens of *B. monophylla*, there may be several slender branches originating from the stem at the lowermost node, each of which will then produce multiple inflorescences (Burt-Utley & McVaugh 2001). *Begonia tlapensis* also differs from *B. monophylla* in its larger stipules [(5.5–)7–13 X (4–)6.5–12.5 mm vs. 5.5–8 X 1.5–4 mm], longer peduncles (3.4–8.3 cm vs. 1.3–5.5 cm), larger staminate sepals (8–13.5 X 8–14 mm vs. 3.5–8 X 2.5–8.5 mm), and larger staminate petals (10–15 X 5.5–10 mm vs. 4–10 X 3–6 mm). *Begonia tlapensis* is readily separated from the usually apetiolate, narrowly lobed leaves of *B. angustiloba* by the lack of bulbils at its nodes, its pilose to lanate pubescence (vs. glabrous), leaf blades with 9–11 primary nerves (vs. 3–4), well-formed upper leaf blades (vs. highly reduced to rudimentary, ovate to linear), and several-flowered inflorescences (vs. 2–3-flowered).

3. BEGONIA MARTINEZII Burt-Utley & Utley, **sp. nov. TYPE. MÉXICO. Guerrero.** MEX 134, 16.8 mi N of Vallecitos de Zaragoza on hwy from La Salitrera to Cd. Altamirano, 6000 ft, 22 Jul 1990, *J. Utley & K. Utley 8538* (holotype: MEXU; isotypes: US, USF). Figure 3.

Monoecious herbs with leafy erect stems to 1 m tall, developing annually from underground tubers 9-11 mm diam, stems branching, often with clusters of small bulbils to 1 mm diam at nodes of stems and inflorescences; internodes of primary stems 5.5–10 cm, glabrous to very sparingly pilose with trichomes to 1 mm; those stems developing from leaf axils very slender. **Leaf blades** oblique,

rarely straight or transverse, ovate in outline, 6.5–13 X 4–7 cm, basally very shallowly to deeply cordate, apically acuminate to attenuate-acuminate, marginally somewhat variable, shallowly 1 or more lobed at ends of major nerves, doubly serrate-crenate, or doubly dentate or serrate and denticulate to serrulate and irregularly ciliate, above appearing glabrous but minutely glandular to very short villous throughout, below glabrous to short villous and minutely glandular, upper blades similar to lower blades but greatly reduced in size; 7–10-palmatinerved; petioles (1.5–)4–9(–12) cm, with a ring of broad villi 1.5–3 mm on the petiole just below the petiole-blade junction, otherwise glabrous to very sparingly villous with trichomes to 0.8 mm; stipules persistent, spreading to reflexed, often asymmetric, broadly to very broadly ovate or deltoid, 2.5–8 X 3.5–8 mm, apically obtuse to truncate, marginally ciliate-denticulate to irregularly ciliate, often minutely glandular and very sparingly villous within, glabrous without. **Inflorescences** axillary and terminal, often producing small clusters of bulbils at bases of branches, symmetrically cymose, appearing 4 or more flowered, usually with 2 male and 2 female flowers; peduncles 5–7.5 cm, glabrous to very sparingly villous; bracts deciduous to persistent, asymmetric, the lowermost broadly ovate to obovate or hemiorbicular, (6–)10–14 X (6–)9–17 mm, unlobed to 2–3 lobed or the 2 bracts fused, marginally irregular ciliate with stalked glandular hairs, denticulate to serrulate, incised or undulate, within sparingly minutely glandular, without minutely glandular and glandular-villous. **Staminate flowers** with pedicels 8–14 mm, glabrous to sparingly glandular or glandular and glandular-villous with trichomes to 1.2 mm; sepals 2, ovate, 18–23 X 14–16 mm, apically acute to acuminate, marginally crenulate to serrulate and glandular with short, stalked hairs, externally irregularly glandular and glandular-villous; petals 2, elliptic to obovate, 14.5–20 X 7–11.5 mm, marginally distally shallowly serrulate-crenulate or undulate, appearing glabrous but minutely glandular; stamens +/- 45–53, monadelphous; filaments 0.5–1.5 mm; anthers obovate to elliptic, 0.9–1 X 0.7–0.8 mm. **Pistillate flowers** with pedicels 5–9 mm, glabrous to conspicuously glandular-villous; bracteoles wanting; tepals 5, variable in shape and size, elliptic to ovate or obovate, 10–18 X 4–9 mm, marginally weakly glandular-crenulate to serrulate, externally glabrous to glandular or glandular and glandular-villous with stalked glandular hairs; ovary apparently trilocular with bipartite placentae, 7 mm, minutely glandular or glandular and glandular-villous with stalked glandular trichomes; styles to 0.7 mm, fused briefly basally; stigmas bicornute. **Capsules** not seen, but ovary wings 3, 2 subequal to each other, triangular and the third appearing marginiform, shallowly triangular to rounded or truncate apically.

Additional specimens examined. MÉXICO. Guerrero. Mpio. Atoyac de Alvarez en las Golondrinas, a 22 km NE de Fila de Caballo, 1600 m, 7 Sept 1983, *E. Martínez S.* and *J.L. Villalobos 4239* (MEXU, USF); 15.8 mi by rd N of El Paraiso on rd from Atoyac de Alvarez to Milpillas, 5440 ft., 4 Jul 1982, *Thomas, Rawlins, & Sholes 2883* (NY).

Etymology. *Begonia martinezii* is named after Esteban Martínez at MEXU, who collected this species in 1983.

Distribution and habitat. *Begonia martinezii* is known only from Guerrero, where it has been collected between 1600 m and 1830 m in evergreen forests or on steep, wet, rocky roadbanks of cloud forests. It is likely to occur in adjacent Michoacán in the appropriate environments.

Begonia martinezii is an attractive tuberous species with large staminate and pistillate flowers that rarely has been collected. This species is variable in its indument, as evidenced by the pubescence observed on the type series, *Utley & Utley 8538*, but in other characters the pubescent specimens are identical to those with very sparse pubescence like *Martínez S. & Villalobos 4239* (USF). The presence of clusters of bulbils to 1 mm like the ones observed on *B. martinezii* can be observed on seven other tuberous *Begonia* from western México that are known to produce clusters of small bulbils to 1 mm in their leaf axils.

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Guerrero: MEX 134, 16.8 miles N of Vallecitos de Zaragoza along highway from La Salitrera (near Zihuatanejo) to Ciudad Altamirano. Steep, wet rocky roadbanks in *zone de neblina*. Elevation 6000 feet.
Herb, bulbilerous, sometimes producing bulbils
John and Kathy Utley # 8538
22 July 1990
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Figure 3. *Begonia martinezii*. Isotype (*Utley & Utley 8538*, USF).

In certain vegetative characters, *Begonia martinezii* is similar to both the Mexican endemic, *B. boissieri* A. DC. from the states of Guerrero and México and the Guatemalan endemic *B. gracilioides* Burt-Utley & Utley, but it is readily distinguished from these species by both vegetative and floral characters. Bulbils have been observed on stems of *B. martinezii* and *B. gracilioides* but are wanting on specimens of *B. boissieri* examined. Stipules of *B. martinezii*, are persistent and broadly to very broadly ovate or deltoid and similar to those of *B. gracilioides* but differ from the very narrowly triangular to very narrowly oblong or obovate and fugacious stipules in *B. boissieri.* There are differences in the numbers of major nerves among these three taxa. Leaf blades of *B. martinezii* are 7–10-palmatinerved, while those of *B. gracilioides* are 6–8-palmatinerved and those of *B. boissieri* are 10–11(–14)-palmatinerved. A major difference among these species is the form of the uppermost leaf blades. In both *B. martinezii* and *B. boissieri*, the uppermost leaves are somewhat reduced, but have the same shape and conspicuous petioles like their lower leaves. In *B. gracilioides* the uppermost leaves are greatly reduced and almost linear with very short petioles to 3 mm. Uppermost leaves like those observed on *B. gracilioides* also are observed on a number of Mexican taxa including *B. angustiloba* A. DC. and *B. balmisiana* Balmis. It is also significant to note that these leaves are occasionally fused with stipules at the nodes (pers. obs.).

Inflorescences of *Begonia martinezii* and B. *gracilioides* are few-flowered and symmetrically cymose, but those of *B. boissieri* are often many-flowered and weakly to strongly asymmetrically cymose. In both *B. martinezii* and *B. boissieri*, the stems are terminated by elongate peduncles bearing 4 or more flowers, but those of *B. gracilioides* have shorter peduncles and 1–2 flowers. Pistillate flowers also distinguish these three species, with those of both *B. martinezii* and *B. gracilioides* having ebracteolate ovaries, while those of *B. boissieri* have bracteolate ovaries with large bracteoles exceeding the ovaries in length at anthesis and bracteole scars that can be observed at the base of the capsules. There also appears to be a difference in capsule wings, with those of *B. martinezii* having two large, narrow asymmetrically triangular wings subequal to each other and a marginiform wing, in contrast to those of both *B. boissieri* and *B. gracilioides* with unequal wings, with the largest broadly but shallowly asymmetrically ovate or triangular and the other two very shallowly lunate to triangular.

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